

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
1 August 2002 (01.08.2002)

PCT

(10) International Publication Number  
**WO 02/059257 A3**

(51) International Patent Classification<sup>7</sup>: **C12N 15/11**

(21) International Application Number: **PCT/IB01/02737**

(22) International Filing Date: 31 October 2001 (31.10.2001)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:  
60/244,209 31 October 2000 (31.10.2000) US

(71) Applicants: **COMMONWEALTH SCIENTIFIC  
AND INDUSTRIAL RESEARCH ORGANISATION**  
[AU/AU]; Limestone Avenue, Campbell, ACT 2601 (AU).  
**GRAINS RESEARCH AND DEVELOPMENT COR-  
PORATION** [AU/AU]; 40 Blackall Street, Barton, ACT  
2600 (AU).

(72) Inventors: **WATERHOUSE, Peter**; 5 Banjine Street,  
O'Connor, Canberra, ACT 2602 (AU). **WANG, Ming-Bo**;  
3 Kyewa Street, Kaleen, Canberra, ACT 2617 (AU).  
**ABBOTT, David**; 39 Macleay Street, Turner, Canberra,  
ACT 2612 (AU).

(74) Agents: **OLIVE, Mark, R.** et al.; FB Rice & Co., 139  
Rathdowne Street, Carlton, VIC 3053 (AU).

(81) Designated States (*national*): AE, AG, AL, AM, AT, AU,  
AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU,  
CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH,  
GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC,  
LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW,  
MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG,  
SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN,  
YU, ZA, ZW.

(84) Designated States (*regional*): ARIPO patent (GH, GM,  
KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian  
patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European  
patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE,  
IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF,  
CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD,  
TG).

Published:

— with international search report

(88) Date of publication of the international search report:  
19 December 2002

*For two-letter codes and other abbreviations, refer to the "Guid-  
ance Notes on Codes and Abbreviations" appearing at the begin-  
ning of each regular issue of the PCT Gazette.*

WO 02/059257 A3

(54) Title: METHOD AND MEANS FOR PRODUCING BARLEY YELLOW DWARF VIRUS RESISTANT CEREAL PLANTS

(57) Abstract: The invention provides a DNA molecule comprising a plant-operable promoter operably linked to a DNA region that is capable of being transcribed in the cells of a cereal plant to produce RNA comprising inverted repeat sequence least about 19 nucleotides from the sequence of an RNA dependent RNA polymerase gene of Barley Yellow Dwarf Virus (BYDV). The DNA molecule is useful for reducing expression of the viral RNA dependant RNA polymerase and for enhancing the resistance of cereal crops to BYDV, optionally in the presence of a viral promoter that normally inactivates other modes of post transcriptional gene silencing. Methods are provided for producing transgenic cereal plant lines comprising the DNA molecule of the invention integrated into their genome, and selecting those lines having resistance to BYDV infection. Transgenic plants having enhanced resistance to BYDV are also provided.

## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/IB01/02737

<b>A. CLASSIFICATION OF SUBJECT MATTER</b>												
Int. Cl. <sup>7</sup> : C12N 15/11												
According to International Patent Classification (IPC) or to both national classification and IPC												
<b>B. FIELDS SEARCHED</b>												
Minimum documentation searched (classification system followed by classification symbols)												
SEE ELECTRONIC DATABASES												
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched												
SEE ELECTRONIC DATABASES												
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)												
CA, WPIDS, MEDLINE, BIOSIS, AGRICOLA. Key words: dsRNA, RNAi inhibition, RNA interference, RNAi, BYDV, CYDV, plant disease/virus, post transcriptional gene silencing, GENE BANK: Sequence IDs 1, 2 and 7												
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>												
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.										
X	Marathe, R. et al, "RNA viruses as inducers, suppressors and targets of post-transcriptional gene silencing", Plant Molecular Biology 2000, 43: 295-306 Abstract on page 175, 176 and 178	1-5, 8-11 and 15-19										
X	Sijen, T. et al, "Post-transcriptional gene-silencing: RNAs on the attack or on the defense?", BioEssays 2000 June; 22(6): 520-31 Abstract on pages 520, 523, and the figure on 524	1-11 and 15-19										
X	WO 0177350 (Large Scale Biology Corporation) 18 October 2001 Page 3 and 4, figure 1, claims 1-5 and 16, 21 and 25	1-5 and 15-19										
<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C <input checked="" type="checkbox"/> See patent family annex												
<p>* Special categories of cited documents:</p> <table border="0"> <tr> <td>"A" document defining the general state of the art which is not considered to be of particular relevance</td> <td>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</td> </tr> <tr> <td>"E" earlier application or patent but published on or after the international filing date</td> <td>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</td> </tr> <tr> <td>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</td> <td>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</td> </tr> <tr> <td>"O" document referring to an oral disclosure, use, exhibition or other means</td> <td>"&amp;" document member of the same patent family</td> </tr> <tr> <td>"P" document published prior to the international filing date but later than the priority date claimed</td> <td></td> </tr> </table>			"A" document defining the general state of the art which is not considered to be of particular relevance	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention	"E" earlier application or patent but published on or after the international filing date	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone	"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art	"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family	"P" document published prior to the international filing date but later than the priority date claimed	
"A" document defining the general state of the art which is not considered to be of particular relevance	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention											
"E" earlier application or patent but published on or after the international filing date	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone											
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art											
"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family											
"P" document published prior to the international filing date but later than the priority date claimed												
Date of the actual completion of the international search 22 August 2002		Date of mailing of the international search report 3 SEP 2002										
Name and mailing address of the ISA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaustalia.gov.au Facsimile No. (02) 6285 3929		Authorized officer  ALISTAIR BESTOW Telephone No : (02) 6283 2450										

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.  
PCT/IB01/02737

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 0049035 (The General Hospital Corporation) 24 August 2000 Pages 2-5, 10-21	1-5 and 15-19
A	WO 0044895 (Kreutzer, R. et al) 3 August 2000 Pages 2-3, and claims 1 and 2	1-5
A	Bruening, G. et al, "Plant gene silencing regularized", Proceedings of the National Academy of Science, 1988, Vol: 95, pp 13349-13351 Whole document	1-5 and 8-19

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/IB01/02737

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report		Patent Family Member			
WO	200177350	AU	200153255		
WO	200044895	AU	200032713	EP	1144623
		DE	19956568	EP	1214945
					END OF ANNEX